

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
PHYSICS **0625/5**

PAPER 5 Practical Test

INSTRUCTIONS

Monday **22 NOVEMBER 1999** Morning 1 hour 15 minutes

Great care should be taken that any confidential information given does not reach the candidates either directly or indirectly.

Instructions for preparing apparatus

In order to check the suitability of apparatus and material, the Physics teacher may study the question paper, in the presence of the officer responsible for question paper security, as soon as it is received. The Physics teacher should not copy the questions or make notes and, after it has been studied, the question paper should immediately be resealed with the other copies.

N.B. The candidates will be instructed not to write out a detailed description of the apparatus; instead, the Supervisor or teacher responsible is asked to give (and attach to the Report form printed on pp. 11 and 12) a *brief* description of the apparatus supplied, mentioning any points which are likely to be of importance to the Examiner in marking the answers. The Supervisor should also report any assistance given to candidates under the regulations explained on page 2. All reports should be signed by the Supervisor and by the person responsible for preparing the apparatus.

In addition to the usual equipment of a physics laboratory, each candidate will require the apparatus specified on pages 3–7. If a candidate breaks any of the apparatus, or loses any of the material supplied, the matter should be rectified and a note made in the Report.

This question paper consists of 9 printed pages and 3 blank pages.

Instructions for the Practical Physics Supervisor

A Assistance to Candidates

The purpose of the Practical Physics test is to find out whether the candidates can carry out simple practical work themselves. The Examiners are aware that candidates may sometimes be unable to show their practical ability through failure to understand some point in the theory of the experiment. If an Examiner were present in the laboratory, he would be willing to give a hint to enable such a candidate to get on with an experiment. In order to overcome this difficulty, the Supervisor is asked to co-operate with the Examiners to the extent of being ready to give (or allow the Physics teacher to give) a hint to a candidate who is unable to proceed.

The following regulations must be strictly adhered to.

- (i) No hint may be announced to the candidates as a whole.
- (ii) A candidate who is unable to proceed and requires assistance must come up to the Supervisor and state the difficulty. Candidates should be told that the Examiners will be informed of any assistance given in this way.
- (iii) A report must be made of any assistance given to the candidate, with the name and index number of the candidate.

It is suggested that the following announcement be made to the candidates.

'The Examiners do not want you to waste time through inability to get on with an experiment. Any candidate, therefore, who is unable to get on with the experiment after spending 5 minutes at it, may come to me and ask for help. I shall report to the Examiners any help given in this way, and some marks may be lost for the help given. You may ask me for additional apparatus which you think would improve the accuracy of your experiments, and you should say, on your script, how you use any such apparatus supplied.'

B Number of sets of apparatus

As a *minimum*, the number of sets of apparatus provided should be $N/4$, where N is the number of candidates (per session): a few spare sets should, preferably, be available to avoid any candidate being delayed when moving to another question.

Centres may find it more convenient and easier to administer if $N/3$ sets (plus one or two 'spares') of apparatus are provided.

The order in which a given candidate attempts the four questions is immaterial.

1 Items to be supplied by the Centre (per set of apparatus unless otherwise specified)

Four identical glass 250 cm³ beakers. See Note 1.

One beaker containing 200 cm³ of water with **no added sugar**, labelled **0 g of sugar**.

Another beaker containing 200 cm³ of water with **25 g of sugar** dissolved in it and labelled **25 g of sugar**.

Another beaker containing 200 cm³ of water with **50 g of sugar** dissolved in it, and labelled **50 g of sugar**.

Another beaker containing 200 cm³ of water with **75 g of sugar** dissolved in it, and labelled **75 g of sugar**.

Ray box that will produce a broad divergent beam of light. See notes 2 and 3.

A white screen, approximately 10 cm high by 15 cm wide supported so that it is vertical.

A 300 mm rule and a sharp pencil

Notes

- Each beaker must have a cross marked in the centre of the underside of the base. The cross must be drawn with permanent ink.

The solutions can be made up in large quantities and then added to the labelled beakers. Different concentration of sugar solution gives a range of values of v between 113 mm, with **75 g of sugar**, to 134 mm, with **0 g of sugar**. Standard, white, household sugar is suitable.

- Candidates will be instructed to place the lamp over point L, as in Fig. 1.1 and Fig. 1.2. To do this, they must be able to see the lamp from above. They are instructed to ask for help if they have any difficulties with this procedure. The lamp in the ray box must have a vertical filament so that the candidates can focus a bright *vertical* line. If all the lamps available have horizontal filaments, such as in vehicle side light-lamps then the ray boxes and lamp holders will have to be adjusted so as to produce a vertical filament.
- If ray boxes are not available, a box constructed from any suitable material e.g. cardboard, to simulate the shielding of a ray box, must be provided.

Items to be supplied by the Syndicate

Nil

Details to the Examiner

Table of results

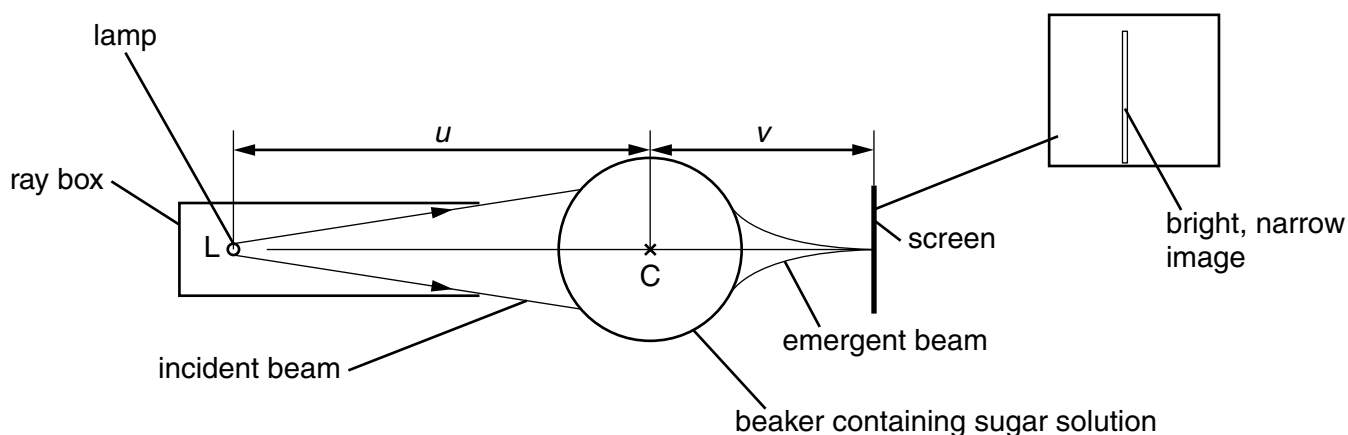
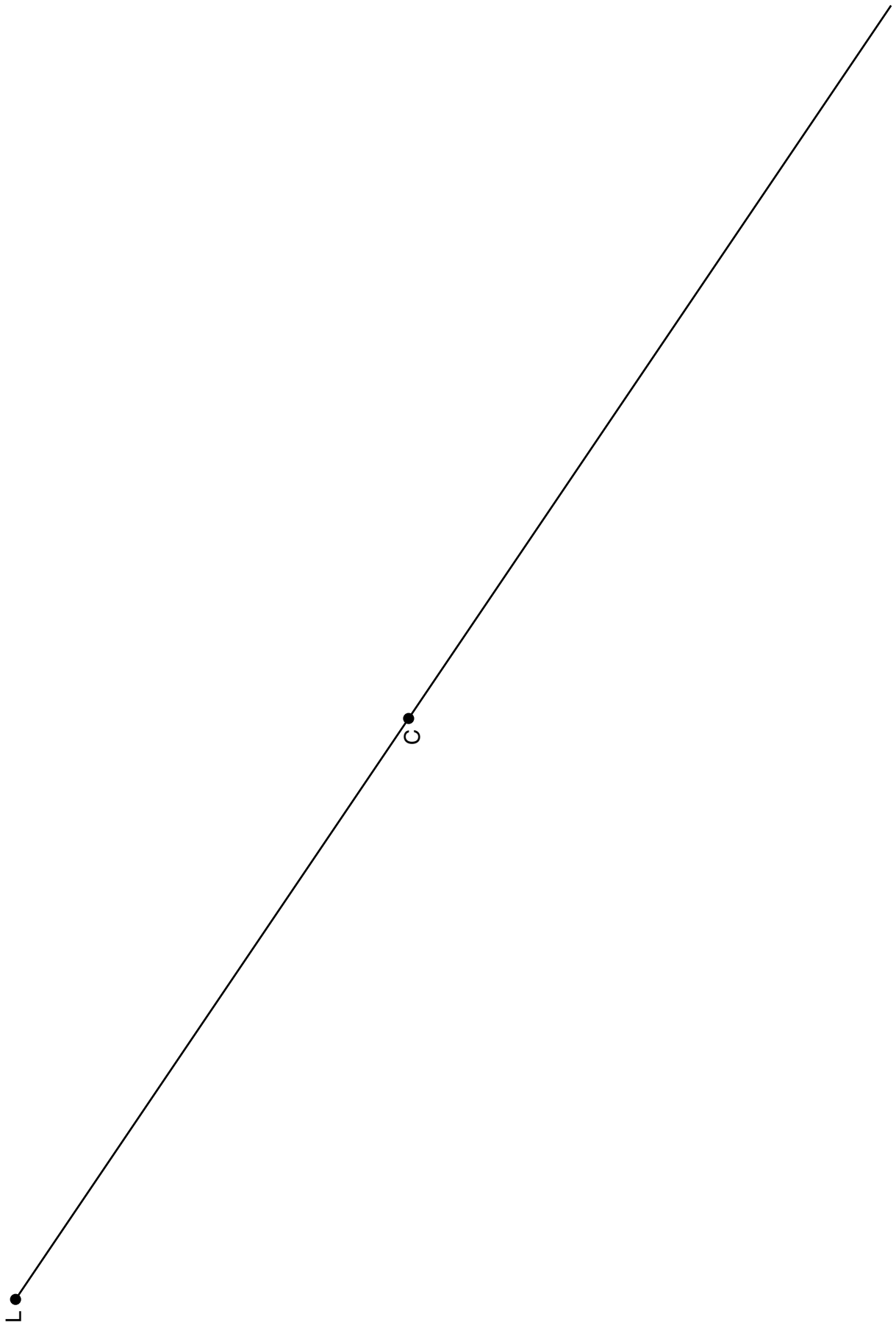


Fig. 1.1

**Fig. 1.2**

2 *Items to be supplied by the Centre (per set of apparatus unless otherwise specified).*

40 cm of clean bare resistance wire wrapped around an insulated former. 32 s.w.g. constantan, 0.27 mm diameter is suitable. See note 2.

Voltmeter, 0-5 V, analogue recommended

Switch

Three 1.5 V dry cells. A power supply cannot be used as candidates will be required to calculate the resistance within the cells. The cells must be connected in series so that connections can be made across each cell, as shown in Fig. 2.1. The +1.5 V terminal must be labelled with the letter X, the +3.0 V terminal with the letter Y and the +4.5 V terminal with the letter Z. See notes 3 and 4.

5 connecting leads

Crocodile clips, for making connections to the resistance wire and the battery, if required

Card, see note 4.

Notes

1. The apparatus is to be set up for the candidate as in Fig. 2.1 with the switch open.

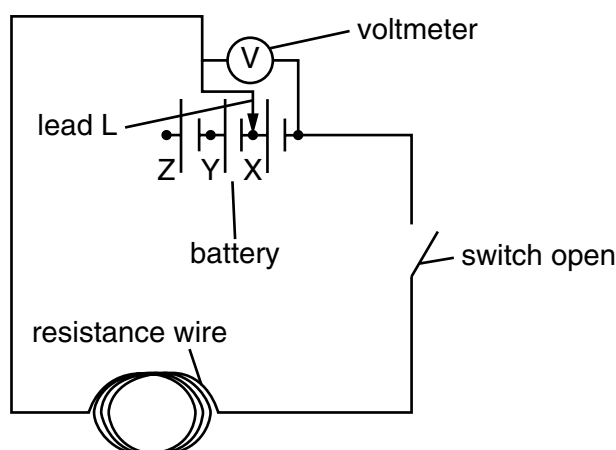


Fig. 2.1

2. The resistance wire must be taped around an insulated former with sufficient bare wire protruding from the insulating tape so that connections can be made. The candidate will not be expected to connect or reconnect the resistance wire.
3. The cells used must give a measureable voltage drop when the switch is closed.
4. The current readings I_X for one cell (1.5 V) must be previously recorded by the supervisor on a card, together with the corresponding currents I_Y and I_Z for 2 and for 3 cells respectively.

$I_X =$	
$I_Y =$	
$I_Z =$	

5. If the apparatus is to be used by a second person, the Supervisor should check that the cells are still in good order.

Items to be supplied by the Syndicate

Nil

Details to the Examiner

Table of results

3 *Items to be supplied by the Centre (per set of apparatus unless otherwise specified)*

A wooden metre rule, labelled as the wooden beam in Fig. 3.1. See note 1.

Metre rule

Small rule, 15 cm or 30 cm is appropriate, or any straight edge that is like a ruler.

Masses totalling 600 g in increments of 100 g. If a mass hanger is used it must have mass 100 g and be labelled as such.

A 'G' clamp, or any other means of clamping the wooden beam to the table

Stand, clamp and boss

Loop of thread that can support 600 g without breaking

Notes

1. The beam should be a wooden metre rule with a small hole drilled at the 1 cm mark, through which a length of thread is looped and tied, so that the masses can be hung from it.
When the wooden beam is clamped with $l = 80$ cm, the depression of the beam with a mass of 600 g suspended from it should be between 10 cm and 11 cm.
If any other type of beam has to be used, then l must be adjusted so as to give a depression between 10 cm and 11 cm.
2. The apparatus is to be set up as in Fig. 3.1. Candidates will need room to be able to move around the wooden beam which will protrude away from the table or bench. The metre rule will need to be supported vertically with the stand, clamp and boss.

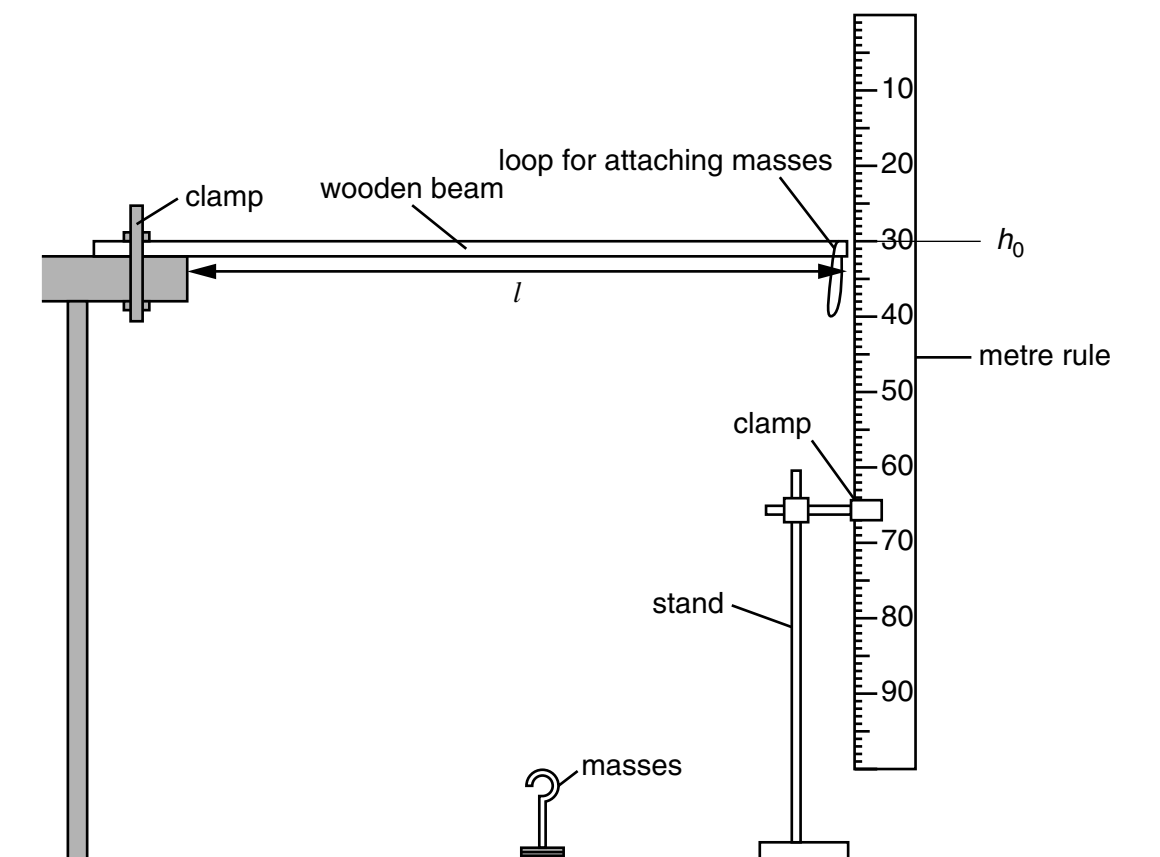


Fig. 3.1

The metre rule is to be set up as close to the end of the wooden beam as possible. The rule must be adjusted so as to give the reading h_0 equal to 30.0 cm. Alternatively, any other whole number of centimetres is suitable.

Items to be supplied by the Syndicate

Nil

Details to the Examiner

Table of results

The length l if different from **note 2**

4 *Items to be supplied by the Centre (per set of apparatus unless otherwise specified)*

A simple pendulum consisting of a 1 m length of thread.

Two blocks between which the thread can slide and then be fastened in the clamp. Two pieces of hardboard or blocks of wood 1 cm thick by 4 cm wide by 4 cm long are suitable. Alternatively a split cork, or any other suitable arrangement, could be used. See note 1.

3 masses, 20 g, 40 g and 50 g. These masses could be in increments of 10 g, such as the type used with 10 g mass hangers, provided that they can be hung easily and securely from the thread. See note 2.

Stopclock or stopwatch, accurate to 0.1 s or better. Student's own stopwatch facility is suitable.

Stand, two clamps and two bosses. See note 3.

Metre rule

Notes

1. The candidates must be able to increase the length of the thread **easily**, by slackening the clamp and pulling the thread through the blocks. Two elastic bands wrapped around the blocks and the clamp will stop the blocks and thread falling out of the jaws of the clamp.
2. A short length (1 cm) of thicker string, with a large knot tied at one end to keep the masses in place, will act as a suitable hanger for the different masses. A standard 10 g mass hanger is **not** suitable.
3. The apparatus will need to be set up at the edge of a table with the metre rule and the pendulum overhanging the table. The metre rule must be clamped with its 0 cm mark directly under the two blocks in such a position that when the pendulum is set oscillating the masses do not hit the rule.
4. The apparatus is to be set up for the candidates with $l = 70$ cm and $M = 20$ g.

Items to be supplied by the Syndicate

Nil

Details to the Examiner

Tables of results

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This form must be completed and returned with the scripts.

REPORT ON PRACTICAL PHYSICS

(IGCSE NOVEMBER 1999)

General

The Supervisor is invited to give details of any difficulties experienced by particular candidates giving their names and candidate numbers. These should include reference to:

- (a) difficulties due to faulty apparatus;
- (b) accidents to apparatus or materials;
- (c) any other information that is likely to assist the Examiner, especially if this cannot be discovered in the scripts;
- (d) any help given to a candidate.

Information required

A plan of workbenches, giving details by index number of the places occupied by the candidates for each experiment for each session, must be enclosed with the answer booklets.

Question 1 Table of results to be enclosed

Question 2 Table of results to be enclosed

Question 3 Table of results to be enclosed

Value of l = (if required)

Question 4 Tables of results to be enclosed



Information required (cont.)

A list by name and index number of candidates requiring help, with details of the help provided.

CENTRE NO

NAME OF CENTRE

Declaration (to be signed by the Principal)

The preparation of the practical examination has been carried out so as to maintain fully the security of the examination.

SIGNED